

## CLAIMS

1. A matching device for allowing an antenna to match a receiving section arranged to receive a signal in a first frequency band and a signal in a second frequency band lower than the first frequency band, said matching  
5 device comprising:

a first terminal arranged to be connected to the antenna;

a first inductor connected between the first terminal and a first node;

a second inductor connected between the first node and a ground,  
10 the second inductor having a capacitive impedance in the first frequency band and having an inductive impedance in the second frequency band;

a first capacitor connected between the first node and a second node;

a second terminal connected to the second node, the second  
15 terminal being arranged to be connected to the receiving section; and

a third inductor connected between the second node and the ground.

2. The matching device according to claim 1, further comprising an  
20 amplifier connected between the second node and the second terminal.

3. The matching device according to claim 1, further comprising:

a first diode connected between the first node and the ground; and

a second diode connected between the first node and the ground,  
25 the second diode being connected in parallel to the first diode in a polarity reverse to a polarity of the first diode.

4. The matching device according to claim 1 further comprising a selector for changing an inductance of the second inductor.

5. The matching device according to claim 4,

5            wherein the second inductor comprises a fourth inductor and a fifth inductor connected in series with the fourth inductor, and

             wherein the selector opens and short-circuits between the ground and a node provided between the fourth inductor and the fifth inductor so as to change the inductance of the second inductor.

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6. The matching device according to claim 5, wherein the fifth inductor comprises a sixth inductor and a seventh inductor connected in series with the fifth inductor.

15           7. The matching device according to claim 5, further comprising:

             a board having the first inductor, the second inductor, the third inductor, and the fourth inductor mounted thereon; and

             a conductor pattern provided on the board so as to connect the fourth inductor with the fifth inductor.

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8. The matching device according to claim 7, wherein the fourth inductor, the conductor pattern, and the fifth inductor are reflow soldered.

9. The matching device according to claim 7, wherein the fourth  
25 inductor and the conductor pattern provides a combined capacitive impedance at the first frequency band.

10. The matching device according to claim 4,

wherein the second frequency band comprises a third frequency band and a fourth frequency band lower than the third frequency band, and

wherein the selector changes the inductance of the second  
5 inductor between a case that the receiving section receives a signal in the third frequency band and a case that the receiving section receives a signal in the fourth frequency band.

11. The matching device according to claim 10, wherein, when the  
10 receiving section receives the signal in the third frequency band, the second inductor has a self resonant frequency between a highest frequency in the third frequency band and a lowest frequency in the first frequency band.

12. The matching device according to claim 10, wherein, when the  
15 receiving section receives the signal in the fourth frequency band, the second inductor has a self resonant frequency between a highest frequency in the fourth frequency band and a lowest frequency in the first frequency band.

13. The matching device according to claim 10, wherein the third  
20 frequency band comprises a VHF high band, and the fourth frequency band comprises a VHF low band.

14. The matching device according to claim 1, further comprising a selector for changing an inductance of the third inductor.

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15. The matching device according to claim 14,

wherein the third inductor comprises a fourth inductor and a fifth

inductor connected in series with the fourth inductor, and

wherein the selector opens and short-circuits between the ground and a node provided between the fourth inductor and the fifth inductor as to change the inductance of the third inductor.

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16. The matching device according to claim 1, further comprising a second capacitor connected in series with the third inductor and between the second node and the ground.

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17. The matching device according to claim 16, wherein a resonant frequency determined by the third inductor and the second capacitor is higher than frequencies in the first frequency band.

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18. The matching device according to claim 1, wherein the first frequency band comprises a UHF band.

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19. The matching device according to claim 19, wherein an impedance at the first terminal of the antenna to be connected to the first terminal in the first frequency band is substantially equal to an impedance at the second terminal of the receiving section to be connected to the second terminal in the first frequency band.

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20. The matching device according to claim 1, wherein the first frequency band comprises a third frequency band and a fourth frequency band lower than the third frequency band, said matching device further comprising:

a third terminal arranged to be connected to a communication

device for receiving a signal in the third frequency band; and

a second capacitor connected between the first terminal and the third terminal.

5        21. The matching device according to claim 20, further comprising a third capacitor connected in series with the third inductor and between the second node and the ground.

10        22. The matching device according to claim 21, wherein a resonant frequency determined by the third inductor and the third capacitor is substantially equal to a center frequency in the fourth frequency band.

15        23. The matching device according to claim 20, further comprising a board having a top surface and a side surface, the board having the first inductor, the second inductor, the third inductor, and the first capacitor mounted on the top surface of the board, wherein the first terminal and the third terminal are provided on the side surface of the board.

20        24. The matching device according to claim 23, further comprising a ground terminal connected to the ground, the ground terminal being provided on the side surface and between the first terminal and the third terminal.

25        25. The matching device according to claim 19, wherein, in the third frequency band, the first inductor, and the second inductor provide a low-pass filter having a cut-off frequency lower than a lowest frequency in the third frequency band.

26. A receiver comprising:

an antenna;

a receiving section arranged to receive a signal in a first frequency  
5 band and a signal in a second frequency band lower than the first frequency  
band; and

an audio output unit to which an output of the receiving section is  
supplied;

a matching device including

10 a first terminal connected to the antenna,

a first inductor connected between the first terminal  
and a first node,

a second inductor connected between the first node and  
a ground, the second inductor having a capacitive impedance in the first  
15 frequency band and having an inductive impedance in the second frequency  
band,

a first capacitor connected between the first node and a  
second node,

a second terminal connected to the second node and the  
20 receiving section, and

a third inductor connected between the second node  
and the ground.

27. The receiver according to claim 26,

25 wherein the antenna has a length not larger than  $1/4$  wavelength  
of the second frequency band, and

wherein the antenna has a resistance substantially equal to a

resistance component of an impedance at the first terminal of the matching device.

28. The receiver according to claim 26, wherein the antenna includes

5 an antenna main body, and

a moving portion provided between the antenna main body and the first terminal of the matching device so as to make the antenna main body movable, the moving portion having a resistance.

10 29. The receiver according to claim 28, wherein the resistance of the moving portion is substantially equal to a resistance component of an impedance at the first terminal of the matching device.

30. The portable receiver according to claim 26, wherein the antenna  
15 includes

an antenna main body, and

a sliding portion connected between the antenna main body and the first terminal of the matching device so as to make the antenna main body slidable, the sliding portion having a resistance.

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31. The receiver according to claim 30, wherein the resistance of the sliding portion is substantially equal to a resistance component of an impedance at the first terminal of the matching device.

25 32. A receiver comprising:

an antenna;

a first receiving section arranged to receive a signal in a first

frequency band;

a second receiving section arranged to receive a signal in a second frequency band lower than the first frequency band, and to receive a signal in a third frequency band lower than the second frequency band;

5 an audio output unit to which outputs of the first receiving section and the second receiving section are supplied; and

a matching device including

a first terminal connected to the antenna,

a first inductor connected between the first terminal

10 and a first node,

a second inductor connected between the first node and a ground, the second inductor having a capacitive impedance in the first frequency band and the second frequency band, the second inductor having an inductive impedance in the third frequency band,

15 a first capacitor connected between the first node and a second node,

a second terminal connected to the second node and the second receiving section,

a third inductor connected between the second node

20 and the ground,

a third terminal connected to the first receiving section,

and

a second capacitor connected between the first terminal and the third terminal.

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33. The receiver according to claim 32,

wherein the antenna has a length not larger than  $1/4$  wavelength



of the first frequency band, and

wherein the antenna has a resistance substantially equal to a resistance component of an impedance at the first terminal of the matching device.